

We claim

1. A gel coat composition comprising a gel coat resin and at least one diluent monomer, wherein the gel coat resin comprises reaction products of a reaction mixture comprising

- (a) a hydroxy-terminated oligoester having weight average molecular weight of about 200 to about 4000;
- (b) a diisocyanate; and
- (c) a hydroxyalkyl (meth)acrylate.

2. A composition according to claim 1, wherein the oligoester is saturated or unsaturated and has a weight average molecular weight of about 500 to about 3000.

3. A composition according to claim 1, wherein a reaction mixture of (a), (b), and (c) contains a molar ratio of about 0.75 to about 1.25 mole (a) to about 1.5 to about 2.5 moles (b) to about 1.5 to about 2.5 moles (c).

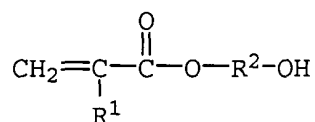
4. A composition according to claim 3, wherein a reaction mixture of (a), (b), and (c) contains a molar ratio of about 0.9 to about 1.1 mole (a) to about 1.7 to about 2.2 moles (b) to about 1.7 to about 2.2 moles (c).

5. A composition according to claim 4, wherein a reaction mixture of (a), (b), and (c) contains a molar ratio of about 0.95 to about 1.05 mole (a) to about 1.7 to about 2 moles (b) to about 1.7 to about 2 moles (c).

6. A composition according to claim 1, wherein the diisocyanate comprises an aliphatic diisocyanate and up to 20% of an aromatic diisocyanate, by total weight of the diisocyanate.

7. A composition according to claim 6, wherein the aliphatic diisocyanate comprises 1,6-hexamethylene diisocyanate, isophorone diisocyanate, 2,4'-dicyclohexylmethane diisocyanate, or 4,4'-dicyclohexylmethane diisocyanate.

8. A composition according to claim 1, wherein the hydroxyalkyl (methyl)acrylate has a structure



wherein R¹ is hydrogen or methyl and R² is a C₁ to C₆ alkylene group or an arylene group.

9. A composition according to claim 8, wherein the hydroxyalkyl (meth)acrylate comprises 2-hydroxyethyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxypropyl methacrylate, or 3-hydroxypropyl methacrylate.

10. A composition according to claim 1 wherein the oligoester comprises a reaction of product of (a) neopentyl glycol, 1,6-hexanediol, or a mixture thereof, and (b) adipic acid.

11. A composition according to claim 10, wherein the diisocyanate comprises isophorone diisocyanate.

12. A composition according to claim 11, wherein the hydroxyalkyl (meth)acrylate comprises 2-hydroxyethyl acrylate.

13. A gel coat composition according to claim 1, wherein the gel coat resin is present in the composition in an amount of about 25% to about 50%, by weight, of the composition.
14. A gel coat composition according to claim 1, further comprising a pigment.
15. A gel coat composition according to claim 1, wherein the diluent monomer comprises an acrylate monomer.
16. A gel coat composition according to claim 1, wherein the diluent monomer comprises a difunctional acrylate monomer.
17. A gel coat composition according to claim 1, wherein the diluent monomer comprises a trifunctional acrylate monomer.
18. A gel coat composition according to claim 1, wherein the diluent monomer comprises styrene, vinyl toluene, α -methylstyrene, divinylbenzene, diallyl phthalate, or triallyl cyanurate.
19. A gel coat composition according to claim 1, wherein the diluent monomer comprises ethylene glycol dimethacrylate.
20. A gel coat composition according to claim 1, wherein the diluent monomer comprises a triacrylate ester of propoxylated glycerol.
21. A cured gel coat prepared by curing a gel coat composition according to claim 1.
22. An article of manufacture having an exterior gel coat prepared by curing a gel coat composition according to claim 1.

23. A gel coat composition comprising a gel coat resin and at least one diluent monomer, wherein the gel coat resin is made by a process comprising the steps of
- (a) preparing a hydroxy-terminated oligoester having a weight average molecular weight of about 200 to about 4000 by reacting (i) a saturated diol and optional saturated triol with (ii) a saturated or unsaturated dicarboxylic acid, a saturated or unsaturated dicarboxylic acid anhydride, or a mixture thereof, in sufficient relative amounts of (i) and (ii) to provide terminal hydroxy groups;
 - (b) adding a hydroxyalkyl (meth)acrylate to the oligoester of step (a) to form a prereaction mixture;
 - (c) then adding a diisocyanate to the prereaction mixture of step (b) to form a reaction mixture; and
 - (d) maintaining the reaction mixture of step (c) at a sufficient temperature for a sufficient time to react essentially all isocyanate moieties of the diisocyanate and yield the urethane acrylate gel coat resin.
24. A composition according to claim 23, wherein the gel coat resin is prepared using a molar ratio of (I) oligoester to (II) diisocyanate to (III) hydroxyalkyl (meth)acrylate of about 0.75 to about 1.25 (I) to about 1.5 to about 2.5 (II) to about 1.7 to about 2.5 (III).
25. A composition according to claim 24, wherein the gel coat resin is prepared using a mole ratio of about 0.9 to about 1.1 (I) to about 1.5 to about 2.2 (II) to about 1.5 to about 2.2 (III).
26. A composition according to claim 24, wherein the gel coat resin is prepared using a mole ratio of about 0.95 to about 1.05 (I) to about 1.7 to about 2 (II) to about 1.7 to about 2 (III).

27. A composition according to claim 23, wherein the diisocyanate comprises an aliphatic diisocyanate and up to 20% of an aromatic diisocyanate, by total weight of the diisocyanate.
28. A composition according to claim 27, wherein the diisocyanate comprises 1,6-hexamethylene diisocyanate, isophorone diisocyanate, 2,4'-dicyclohexylmethane diisocyanate, or 4,4'-dicyclohexylmethane diisocyanate.
29. A composition according to claim 23, wherein the oligoester comprises a reaction product of (a) neopentyl glycol, 1,6-hexanediol, or a mixture thereof, and (b) adipic acid.
30. A composition according to claim 29, wherein the diisocyanate comprises isophorone diisocyanate.
31. A composition according to claim 23, further comprising a pigment.